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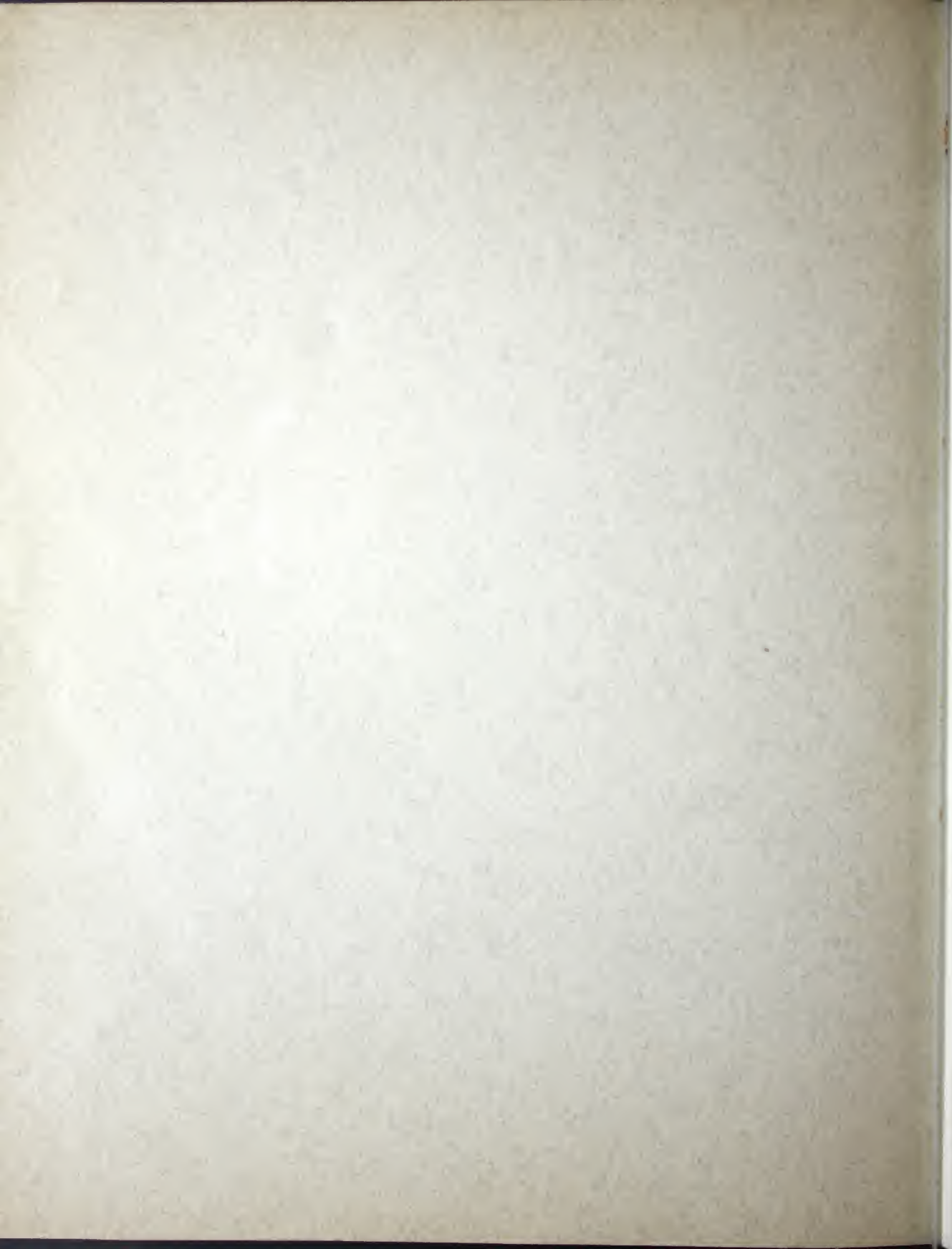
A. I. A. File No. 31-F-19

# LIGHTING SPECIFIC FOR HOSPITALS



HOLOPHANE COMPANY, INC.  
NEW YORK

A. I. A. File No. 31-F-19



# LIGHTING HOSPITALS

FOLIO No. 7

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ENGINEERING DEPARTMENT  
*of*  
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## Requirements for HOSPITAL LIGHTING

The recent increase in hospital building has been accompanied by great improvement in design and equipment.

Not the least of this betterment concerns the lighting. The Holophane Company has been a leader in studying the conditions and devising suitable equipment and methods.

A careful analysis of the lighting requirements of a hospital of the most modern type, bearing in mind the peculiar need for economy that is usually a most important consideration, leads to a separation of the rooms into twelve groups, each of which requires its own distinctive lighting treatment.

### GROUP No. 1

AMBULANCE ENTRANCE.  
OUTSIDE SPACES, PASSAGES AND YARDS.

These areas require a lighting unit giving a Wide Spread uniform distribution to permit of spacing far apart; of weather-proof construction, non-deteriorating and easily maintained.

The Holophane No. 830 series best meets these requirements. (See page 13 and Lighting Schedule, page 6).

### GROUP No. 2

BACTERIOLOGICAL ROOMS.  
CYSTOSCOPIC ROOMS.  
KITCHENS.  
LAUNDRY.  
LINEN ROOMS.  
PLATE ROOM.  
RADIO ROOM.  
SERVICE ROOMS.  
SERVING ROOM.  
SEWING ROOMS.  
STERILIZING ROOMS.  
TELEPHONE SPACE.  
UTILITY ROOMS.

This group requires a generally high level of uniform horizontal and vertical illumination, secured from a totally enclosing, dust-resisting unit.

The Holophane Reflector-Refractor series meets this specification most closely. (See page 10 and Lighting Schedule, page 6).

### GROUP No. 3

COAT ROOMS.  
ELECTRICAL EQUIPMENT SPACE.  
TOILETS.

These rooms require a fair intensity of illumination from low priced equipment.

The Holophane open bottom "I" series satisfies these requirements. (See page 12 and Lighting Schedule, page 6).

### GROUP No. 4

CHART ROOMS.  
LOCKERS.

A high degree of vertical illumination is necessary.

This can be secured with the Holophane "interior lighting 2-Way" series. (See page 11 and Lighting Schedule, page 6).

### GROUP No. 5

BATTERY ROOM.  
GARAGE.

The chief requirements here are safety and permanency of equipment. See page 11 and Lighting Schedule page 6, for Holophane vapor and acid proof series.

### GROUP No. 6

BARBER SHOP.  
CORRIDORS.  
DENTAL SURGERY.  
(See note under Group No. 11.)  
DIAGNOSTIC ROOMS.  
EXAMINING ROOMS.  
FRACTURE ROOM.  
INSTRUMENT ROOM.  
LIBRARY.  
OFFICES.  
REST ROOMS.  
STAFF ROOMS.  
THERAPY ROOMS.

The primary feature of the lighting of this group should be eye-comfort. The light should be glareless. The intensity must in most cases be high, and the unit used totally-enclosing, easily cleaned and dirt-tight.

The Holophane Filterlite series possesses the above characteristics. (See pages 8, 9 and Lighting Schedule, page 6).

### GROUP No. 7

MAJOR OPERATING ROOMS.  
OBSTETRICAL ROOMS.  
SEPTIC OPERATING ROOMS.

The Holophane No. 18 "Multiple Control Lens System" has been designed for these rooms. (See pages 14 to 22 and Lighting Schedule on page 6).

### GROUP No. 8

EYE, EAR, NOSE AND THROAT ROOM.

The Holophane No. 4 "Multiple Border Lens System" has been designed for this service. (See page 23 and Lighting Schedule, page 6).



**GROUP No. 9**

EMERGENCY ROOMS.

The Holophane No. 5 "Multiple Spot Lens System" has been designed for these rooms. (See page 25 and Lighting Schedule, page 6).

**GROUP No. 10**

DELIVERY ROOMS.

The Holophane No. 3 "Multiple Strip and Border Lens System" has been designed for these rooms. (See pages 26, 27 and Lighting Schedule, page 6).

**GROUP No. 11**

DENTAL SURGERY.

Special Lighting in addition to the general illumination is required here, and devices such as those manufactured by the Electro Dental Manufacturing Co. of Philadelphia, and the Pelton & Crane Co. of Detroit, have been specially designed and widely used for this service. (See page 28 and Lighting Schedule, page 6).

**GROUP No. 12**

LABOR ROOMS.

PRIVATE WARDS.

SEMI-PRIVATE WARDS.

PUBLIC WARDS.

In illuminating the sick room of a hospital consideration must be given to the normal requirements of a light which produces illumination up to the sleeping hour in the evening, which will be adequate for reading, eating, examination of patients by the physicians and nurses, and general supervision. The proper illumination for this requirement is 3 to 5 foot-candles.

The patient is facing the light due to his reclining position and it is of the greatest importance, therefore, that the luminaire be of low brilliancy, because a relatively bright source in the patient's field of vision is extremely distressing and has a marked unfavorable reaction on his condition.

In addition to the normal illumination, there should be a night light of 0.1 foot-candle, uniformly distributed over the entire area of the sick room. This dim illumination is necessary for the convenience of the nurse and to prevent any unnecessary noise and confusion when the attendants are making their rounds.



Placing the night light in the floor or wall is to be avoided, as sharp contrasts result and the attendant does not have the freedom of action possible when the entire room is uniformly but dimly illuminated as with natural twilight.

The night light (dim light) should come from the same source as the normal illumination, to give the desired uniformity of distribution. It is also a well recognized fact that a dim light emanating from the usual place is not noticed by the sleeper, whereas a light coming from an unusual direction, may awaken the patient. This is especially the case with light sleepers and nervous people.

The metal fixture parts of an ideal hospital luminaire should be substantially built of heavy gauge brass and must have a smooth, flowing contour designed to minimize the accumulation of dust and to facilitate cleaning. It is also important that these have no ornamentation as any such design is apt to become very tiring and even irritating to the patient.

The luminaire should be of plain, simple, strong construction and of low brightness, without ornamentation. Two levels of illumination should be provided,—3 to 5 foot-candles for the normal light and 0.1 foot-candle for the night light. It is essential that the luminaire be placed in the usual center of ceiling position to insure uniform distribution.

The Holophane "Twilite" series conforms to these requirements. (See Lighting Schedule, page 6 and data on page 7).

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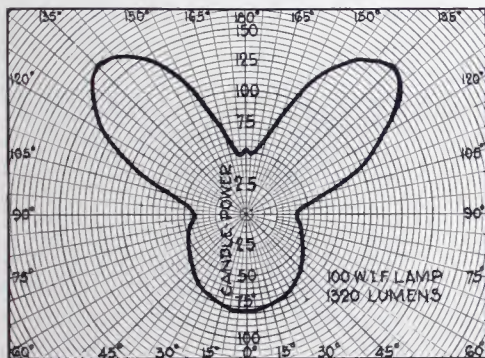
## LIGHTING SCHEDULE

A typical lighting schedule for suggested incorporation in specifications follows on the next page and is succeeded by complete data on each specific referred to under the preceding group headings, with especially detailed description of the Surgery Lighting Specifics.

## Typical Hospital Lighting Schedule

| LOCATION                      | FOOT-CANDLES |       | LAMP                       |       | LIGHTING UNIT     | PAGE  |
|-------------------------------|--------------|-------|----------------------------|-------|-------------------|-------|
|                               | HOR.         | VERT. | WATTS                      | TYPE  |                   |       |
| Ambulance Ent.                | 0.5          |       | 60-200                     | "C"   | 830 or 832        | 13    |
| Barber Shop                   | 10.0         |       | 150-200                    | "C"   | Filterlite        | 8-9   |
| Battery Room                  | 3.0          |       | 100-150                    | "C"   | 02328             | 11    |
| Bacteriological Rooms         | 10.0         | 5.0   | 150-300                    | "C"   | R-r               | 10    |
| Chart Rooms                   |              | 5.0   | 60                         |       | 02176 with A.C.C. | 11    |
| Coat Rooms                    | 3.0          |       | 60-150                     | "C"   | C-CSI             | 12    |
| Corridors                     | 3.0          |       | 150                        | "C"   | Filterlite        | 8-9   |
| Cystoscopic Rooms             | 10.0         | 5.0   | 150-300                    | "C-2" | R-r               | 10    |
| Dental Surgery                | 5.0          |       | 150-300                    | "C"   | Filterlite        | 8-9   |
|                               |              |       | Special local illumination |       | See Page 4        | 28    |
| Diagnostic Rooms              | 10.0         |       | 150-300                    | "C"   | Filterlite        | 8-9   |
| Elec. Equip. Space            | 5.0          |       | 200                        | "C"   | 6541              | 12    |
| Examining Rooms               | 10.0         |       | 150-300                    | "C"   | Filterlite        | 8-9   |
| Fracture Room                 | 10.0         |       | 150-300                    | "C"   | Filterlite        | 8-9   |
| Garage                        | 3.0          |       | 100-150                    | "C"   | 02328             | 11    |
| Instrument Room               | 10.0         |       | 150-300                    | "C"   | Filterlite        | 8-9   |
| Kitchens                      | 10.0         |       | 150-300                    | "C"   | R-r               | 10    |
| Labor Rooms                   | 2.0          |       | 60                         | "C"   | Twilite           | 7     |
| Laundry                       | 10.0         |       | 150-300                    | "C"   | R-r               | 10    |
| Library                       | 10.0         |       | 150-300                    | "C"   | Filterlite        | 8-9   |
| Linen Room                    | 5.0          |       | 100-200                    | "C"   | R-r               | 10    |
| Lockers                       |              | 5.0   | 60                         |       | 02176             | 11    |
| Offices                       | 10.0         |       | 100-300                    | "C"   | R-r               | 10    |
|                               |              |       | 150-500                    | "C"   | Filterlite        | 8-9   |
| <b>Operating Rooms:</b>       |              |       |                            |       |                   |       |
| (a) Major                     | 1200.0       | 250.0 | 150                        | "C"   | No. 18 M. C. L.   | 14-22 |
| (b) Obstetrical               | 1200.0       | 250.0 | 150                        | "C"   | No. 18 M. C. L.   | 14-22 |
| (c) Septic                    | 1200.0       | 250.0 | 150                        | "C"   | No. 18 M. C. L.   | 14-22 |
| (d) Eye, Ear, Nose and Throat | 300.0        | 150.0 | 60                         | "C"   | No. 4 M. B. L. S. | 23    |
| (e) Emergency                 |              | 60.0  | 150                        | "C"   | No. 5 M. S. L.    | 25    |
| (f) Delivery                  | 200.0        | 400.0 | 60-200                     | "C"   | No. 3 M. S. B. L. | 26-27 |
| Plate Room                    | 3.0          |       | 100-200                    | "C"   | R-r               | 10    |
| Radio Room                    | 5.0          |       | 150-300                    | "C"   | R-r               | 10    |
| Rest Rooms                    | 5.0          |       | 150-300                    | "C"   | Filterlite        | 8-9   |
| Service Rooms                 | 8.0          |       | 150-300                    | "C"   | R-r               | 10    |
| Sewing Rooms                  | 15.0         |       | 200-500                    | "C"   | R-r               | 10    |
| Staff Rooms                   | 8.0          |       | 200-300                    | "C"   | Filterlite        | 8-9   |
| Sterilizing Rooms             | 10.0         |       | 200-300                    | "C"   | R-r               | 10    |
| Telephone Space               | 5.0          |       | 150-200                    | "C"   | R-r               | 10    |
| Therapy                       | 5.0          |       | 200-300                    | "C"   | Filterlite        | 8-9   |
| Toilets                       | 3.0          |       | 60-150                     | "C"   | C-CSI             | 12    |
| Utility Rooms                 | 5.0          |       | 100-200                    | "C"   | R-r               | 10    |
| <b>Wards:</b>                 |              |       |                            |       |                   |       |
| (a) Private                   | 5.0          |       | 60-100                     | "C"   | Twilite           | 7     |
| (b) Semi-Private              | 4.0          |       | 60-100                     | "C"   | Twilite           | 7     |
| (c) Public                    | 3.0          |       | 60-150                     | "C"   | Twilite           | 7     |
| Yard Space                    | 0.25         |       | 75-200                     | "C"   | 830-832           | 13    |

## Holophane Twilite



The Holophane Twilite glassware is composed of a lower, upward-refracting bowl and an upper diffusing bell, clamped together. The prisms are on the inside; the outside having a fire-polished smooth surface. The fixture is designed with the same smooth-flowing lines and dust-resisting, easily cleaned contour as the glassware, of heavy brass, finished in hospital gray Duco. The assembled unit is dust-tight, of handsome, appropriate appearance. A double socket in the C-7326 and a triple socket in the C-7346 and S-7346 provides for a 75 watt clear lamp for the normal illumination (reading level) and one or two four candlepower lamps for the dim light (twilight level). Fixtures are furnished with fixture wire but are not wired.

Mounting height not more than 12 feet to light center.

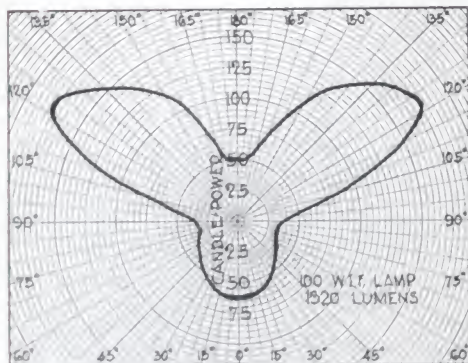
Spacing: Not more than 15 feet.

Statuary bronze, white or other finishes, can be supplied on request at a small extra cost depending on finish.

| CATALOG NUMBER | DIMENSIONS |                     | LAMP      | REMARKS                  |
|----------------|------------|---------------------|-----------|--------------------------|
|                | DIAMETER   | DEPTH               |           |                          |
| 7326           | 12"        | 11 $\frac{3}{16}$ " | 60- 75 w. | Pull Chain Canopy Switch |
| C-7326         | 12"        | 16 $\frac{7}{8}$ "  | 60- 75 w. |                          |
| 7346           | 14"        | 12 $\frac{3}{8}$ "  | 75-100 w. | Furnished if desired.    |
| C-7346         | 14"        | 17"                 | 75-100 w. |                          |
| S-7346         | 14"        | 30"                 | 75-100 w. |                          |



## Holophane Filterlite



The Filterlite is the latest, most efficient, and most successfully dust-resisting enclosing unit of the indirect lighting type. It is made in two parts which are clamped together with spring clips. The lower part has a separate inside diffusing liner bolted in place. The unit is shipped assembled. All the prismatic surfaces are on the inside and all outside surfaces are smooth. The diffusing liner together with the refracting prisms on the lower part strongly direct the light upward where it is highly diffused by the diffusing prisms on the upper part. The surface brightness of the Filterlite is low. Fixtures are furnished with sockets and fixture wire but are not wired.

Mounting height not more than 12 feet to light center.

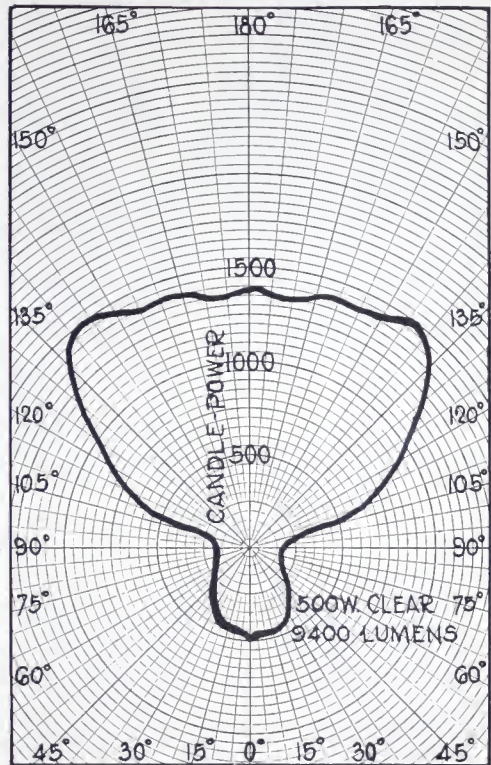
Spacing: Not more than 15 feet.

| CATALOG NUMBER | DIMENSIONS |                    | LAMP      | REMARKS   |
|----------------|------------|--------------------|-----------|---|
|                | DIAMETER   | DEPTH              |           |   |
| 7322           | 12"        | 10 $\frac{1}{2}$ " | †100-150w | The standard finish of the fixture is statuary bronze. Hospital gray, white or other finishes can be supplied on request at a small extra cost depending on finish. |
| 7344           | 14"        | 12 $\frac{1}{2}$ " | 200-300w  |   |
| CF-100         | 12"        | 15 $\frac{3}{8}$ " | †100-150w |   |
| F-100          | 12"        | 37 $\frac{1}{8}$ " | †100-150w |   |
| CF-200         | 14"        | 18 $\frac{1}{4}$ " | 200w      |   |
| F-200          | 14"        | 48 $\frac{3}{8}$ " | 200w      |   |
| CF-300         | 14"        | 18 $\frac{1}{4}$ " | 300w      |   |
| F-300          | 14"        | 48 $\frac{3}{8}$ " | 300w      |   |

†With inside frosted lamp use  $\frac{3}{8}$ " socket extension.



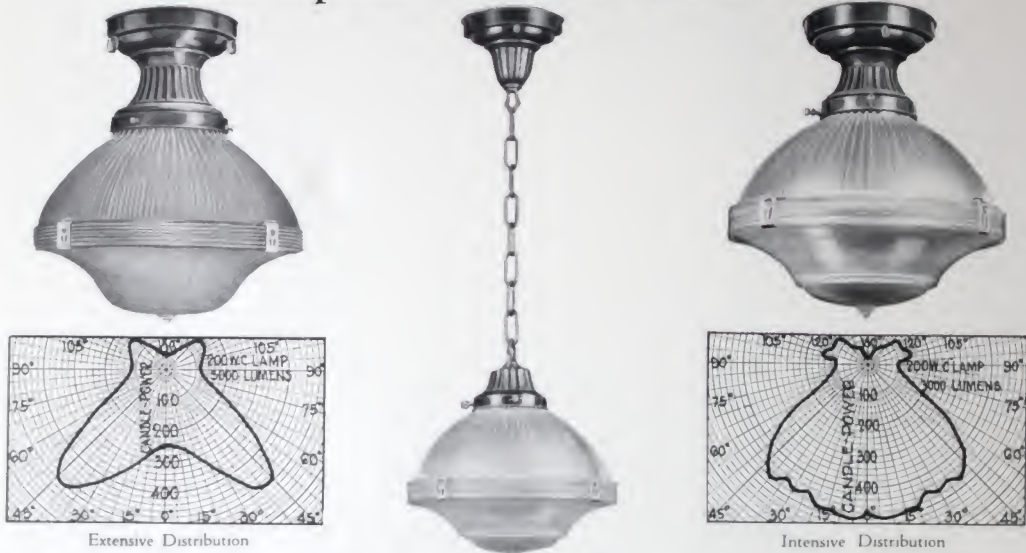
# Holophane Filterlite



The 500 Watt Filterlite is similar in prismatic construction to the smaller Filterlite. The mechanical construction differs in that the glass is held by a metal band supporting the lower bowl. The upper glass bell rests on the lower bowl and is closed at the top (the electrical connection being made by a plug), so that the assembled unit is dust-tight. Fixture wire and socket is furnished but units are not wired.

| CATALOG<br>NUMBER | DIMENSIONS |       | LAMP     | REMARKS                        |
|-------------------|------------|-------|----------|--------------------------------|
|                   | DIAMETER   | DEPTH |          |                                |
| 7388              | 18"        | 23"   | 300-500w | Fixture finish—Statuary Bronze |
| F-500             | 23"        | 72"   | 300-500w |                                |

# Holophane Reflector-Refractors



Holophane direct lighting units are totally enclosing globes of the reflector-refractor type. The top part has accurately formed reflecting prisms which reflect the light downward onto the lower part which has refracting prisms that direct the light into the required directions. The inside surface of the unit is Velvet Finished and emits the light in a well diffused manner with high efficiency. The fixtures are made of heavy gauge brass. They are equipped with canopy strap for mounting and include porcelain socket with quick wiring arrangement. They are embossed with an attractive fluted design to harmonize with the prismatic glass design. Spacing; not to exceed twice the mounting height.

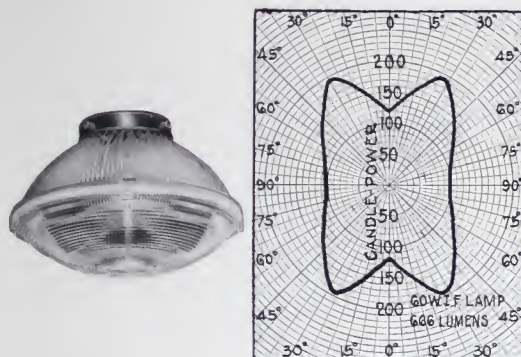
The standard finish of the fixture is statuary bronze. Hospital gray, white or other finishes can be supplied on request at a small extra cost depending on finish.

| CATALOG NUMBER         |                        | DIMENSIONS |         | LAMP     | REMARKS          |
|------------------------|------------------------|------------|---------|----------|------------------|
| EXTENSIVE DISTRIBUTION | INTENSIVE DISTRIBUTION | DIAMETER   | DEPTH   |          |                  |
| 2110                   |                        | 7 1/2"     | 6 1/8"  | 75w      | Removable Bottom |
| C-2110                 |                        | 7 1/2"     | 10 1/2" | 75w      | "                |
| S-2110                 |                        | 7 1/2"     | 29 1/2" | 75w      | "                |
| 2120                   |                        | 9 3/4"     | 7 3/4"  | 100-150w | "                |
| C-2120                 |                        | 9 3/4"     | 12"     | 100-150w | "                |
| S-2120                 |                        | 9 3/4"     | 31 1/8" | 100-150w | "                |
| 2130                   |                        | 11 1/8"    | 9 3/8"  | 200w     | "                |
| C-2130                 |                        | 11 1/8"    | 13 3/8" | 200w     | "                |
| S-2130                 |                        | 11 1/8"    | 32 3/4" | 200w     | "                |
|                        | 2133                   | 11 1/8"    | 9 3/8"  | 200w     | "                |
|                        | C-2133                 | 11 1/8"    | 13 3/8" | 200w     | "                |
|                        | S-2133                 | 11 1/8"    | 32 3/4" | 200w     | "                |
| 2140                   |                        | 14"        | 10 7/8" | 300-500w | "                |
| C-2140                 |                        | 14"        | 15 1/4" | 300-500w | "                |
| S-2140                 |                        | 14"        | 34"     | 300-500w | "                |
| 2140-6"                |                        | 14"        | 10 1/2" | 300-500w | "                |
| C-2140-6"              |                        | 14"        | 16 1/8" | 300-500w | "                |
| S-2140-6"              |                        | 14"        | 35"     | 300-500w | "                |
|                        | 2143                   | 14"        | 10 7/8" | 300-500w | "                |
|                        | C-2143                 | 14"        | 15 1/4" | 300-500w | "                |
|                        | S-2143                 | 14"        | 34"     | 300-500w | "                |
| 2170                   |                        | 9 7/8"     | 7 1/8"  | 100-150w | Closed Bottom    |
| C-2170                 |                        | 9 7/8"     | 12"     | 100-150w | "                |
| S-2170                 |                        | 9 7/8"     | 31"     | 100-150w | "                |
| 2180                   |                        | 12"        | 9 1/2"  | 200w     | "                |
| C-2180                 |                        | 12"        | 15"     | 200w     | "                |
| S-2180                 |                        | 12"        | 33 1/4" | 200w     | "                |

1With inside frosted lamp use 1/4" socket extension.



## Holophane Aisle Unit

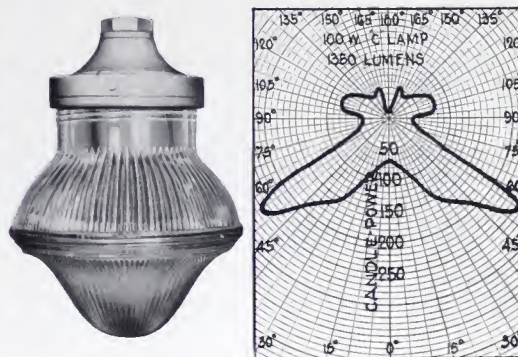


Distribution in Plan

No. 02176 is a Holophane Planned Lighting Specific designed for such locations as the aisles between library stacks, in locker rooms, chart rooms, map rooms, and similar places. The distribution is such that the objects forming the vertical sides of the aisles (books, lockers, bins, charts, etc.), are brightly illuminated while the aisle itself, and therefor the observer, is in a shadow zone. The construction of the unit is similar to the reflector-refractor except that the lower prismatic element is designed to give uniform vertical illumination. The fixture is of minimum depth to allow for the scant headroom usually found in these locations. The units should preferably be mounted seven feet from the floor on six feet spacings over the center of the aisle. The word "Aisle" is molded on the lower part of the globe to indicate proper orientation. The standard finish of the fixture is statuary bronze. Hospital gray, white or other finishes can be supplied on request at a small extra cost depending on finish.

| CATALOG NUMBER | DIMENSIONS        |                   | LAMP   |
|----------------|-------------------|-------------------|--------|
|                | DIAMETER          | DEPTH             |        |
| *2176          | 9 $\frac{7}{8}$ " | 6 $\frac{1}{2}$ " | 60-w-A |
| 02176          | 9 $\frac{7}{8}$ " | 6 $\frac{3}{4}$ " |        |

## Holophane Vapor and Acid Proof Unit



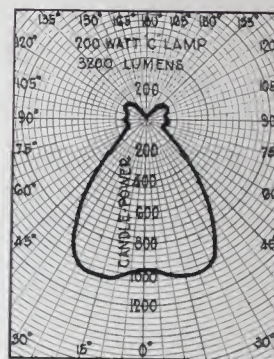
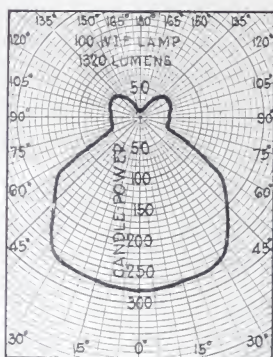
The Holophane No. \*2328 Vapor, Acid and Water Proof Globe combines the virtues of a vaporproof globe and reflector. It embodies the well known Holophane enclosing globe construction, the reflecting prisms being on the upper portion and the refracting and diffusing prisms on the lower surface. No. 02328 is made with a special Holophane aluminum alloy fitter as illustrated and may also be used with Crouse-Hinds, Benjamin, Veco, Arnesen and VV Fittings Co.; vaporproof fittings.

Spacing: Should not exceed 2 $\frac{1}{2}$  times the mounting height.

\*Glass only.  
†Clear lamp.

| CATALOG NUMBER | DIMENSIONS        |                    | LAMP                    |
|----------------|-------------------|--------------------|-------------------------|
|                | DIAMETER          | DEPTH              |                         |
| *2328          | 7 $\frac{1}{4}$ " | 8 $\frac{1}{4}$ "  | † 75w<br>†100w<br>†150w |
| 02328          | 7 $\frac{1}{4}$ " | 10 $\frac{1}{4}$ " |                         |

## Holophane Reflectors



No. C-CSI comprises a Super-Efficiency intensive reflector mounted in a ceiling holder with porcelain socket, designed to give maximum efficiency with Mazda C Lamps. It is designed for use in all strictly utilitarian locations and wherever high efficiency is required. Spacing should not exceed  $1\frac{1}{2}$  times the mounting height. The standard finish of the fixture is statuary bronze. Hospital gray, white or other finishes can be supplied on request at a small extra cost depending on finish.

No. 6541 comprises the Holophane No. 654 intensive reflector with a 4" box cover spun on to the metal neck. A porcelain socket is included. This adaptation of the No. 654 General Utility unit makes a simple complete unit for attaching directly on the ears of a 4" outlet box. Spacing should not exceed  $1\frac{1}{4}$  times the mounting height.

No. 6541 usually should be used on ceilings not over 12 feet in height. The finish is dull nickel.

\*Glass only.

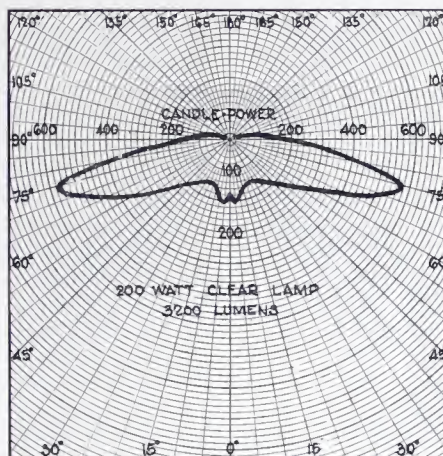
†With inside frosted lamp use  $\frac{7}{8}$ " socket extension.

| CATALOG NUMBER | DIMENSIONS         |                   | LAMP      |
|----------------|--------------------|-------------------|-----------|
|                | DIAMETER           | DEPTH             |           |
| C-CSI- 75      | 8"                 | 5 $\frac{7}{8}$ " | †75w      |
| C-CSI-100      | 8 $\frac{5}{8}$ "  | 6 $\frac{1}{8}$ " | †100-150w |
| C-CSI-200      | 10 $\frac{1}{8}$ " | 7 $\frac{3}{8}$ " | 200w      |

| CATALOG NUMBER | DIMENSIONS         |                    | LAMP |
|----------------|--------------------|--------------------|------|
|                | DIAMETER           | DEPTH              |      |
| *654           | 10 $\frac{3}{8}$ " | 8 $\frac{1}{2}$ "  | 200w |
| 6541           | 10 $\frac{3}{8}$ " | 10 $\frac{5}{8}$ " | 200w |



## Holophane Widespread Lights for Out-Door Use



Hood, heavy gauge spun copper; finish, natural; socket, porcelain medium with  $\frac{1}{2}$ " cap; refractors, Holophane Nos. 4334 and 4337. Used for general illumination for yards and over exits. Due to Wide Spread light distribution a **uniform** low intensity of illumination can be obtained when installed on wide spacings. This uniform lighting is to be contrasted with the usual light and dark areas so noticeable with other lighting units when spaced far apart.

Spacing: For uniform illumination, not more than 6 times the mounting height.

| CATALOG<br>NUMBER | DIMENSIONS        |                    | LAMP                      |
|-------------------|-------------------|--------------------|---------------------------|
|                   | DIAMETER          | DEPTH              |                           |
| 830               | 7 $\frac{5}{8}$ " | 10"                | †75-†100w<br>150w<br>200w |
| 832               | 8 $\frac{1}{2}$ " | 12 $\frac{3}{4}$ " |                           |

†With inside frosted lamp use  $\frac{7}{8}$ " socket extension.

## A New Method of Lighting Major Operating Rooms

Holophane engineers have made an exhaustive study of the methods formerly used for lighting hospital surgeries and have developed one that makes use of the advantages of these former systems, while at the same time avoiding their shortcomings. A model operating room was built in our Engineering Department and these older methods experimented with. The various lighting factors were carefully analyzed and weighed, the essentials of a good system noted, and then incorporated in the Holophane specific for this application.

The problem was:

- (a) How to put enough light on the wound from many directions to stand the high absorption and shading loss.
- (b) How to confine this super-intensity to the wound area.
- (c) How at the same time to spread sufficient light around the room to prevent eye-adaptation difficulties, and yet not so much as to compete with the wound illumination.
- (d) All at a reasonable cost.

Listing the factors they are:

1. A desirable wound illumination of 1200 foot-candles.
2. An illumination of the general field such that the reflected light is just a little less bright than the interior of the wound (usually means from 30 to 40 foot-candles).
3. A variable dominant direction to the light. An essential of good vision is light from a dominant direction, but as the operating field and the angle of vision vary from operation to operation, the main direction of the light must be capable of appropriate change.
4. A source of large area to avoid harmful shadows and secure adequate diffusion.
5. High vertical illumination (see curve on page 19).
6. No glare.



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## LIGHTING SPECIFICS FOR SURGERIES

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7. No annoying heat.
8. Reasonable cost of installation, operation and maintenance.
9. Multiple lamping (some devices put only one lamp between life and death).
10. Flexibility of light with fixity of fixture.

The Holophane lens members, Nos. 755 and 756, have been designed for this service as parts of an optical train which can be built up and fitted exactly to the peculiarities of each individual operating room.

The train consists of reflector, lamp and lens in such relation to each other that the maximum beam strikes the center of the operating area. The overflow from the lens takes care of the general field illumination. The optical characteristics of the lens are such that a three dimensional soft or dissolving spot is developed to take account of varying thicknesses of bodies and heights of table.

The lenses are mounted in a frame suspended from the ceiling, usually flush with a furled ceiling, and occupying about seventy-two square feet. The individual plates combine to make one huge lens that focusses on the operating table.

The "spot" has necessarily an area larger than the wound. The extra area of high illumination should be absorbed by a neutral colored cover.

The lenses are described on page 16.

The diagrams on pages 17, 20, 21 and 22 show the application of the lenses to major, obstetrical, septic and similar operating rooms.

The curves on page 19 show the distribution of horizontal and vertical illumination from this system when using 2300 watts.

Photograph of the Holophane laboratory installation is shown on page 18.

In the past a surgery lighting device had to be moved to change the direction of the light on the wound. The new method permits the light pattern to be varied to suit different surgical conditions without manipulating cumbrous mechanisms. The light is moved instead of the fixture.

After a little practice permanent light patterns can be worked out by the hospital staff covering the more frequently recurring operations, so that when an appendectomy is listed, say, the O. R. nurse can refer to the light pattern that experience has shown is most effective for such an operation and turn on the corresponding switches, thus "setting" the visual conditions for optimum performance before the advent of the surgeon. This only takes a moment.

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## LIGHTING SPECIFICS FOR SURGERIES

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Holophane prismatic plate No. 755 has concentric prisms arranged to form a lens having a  $5\frac{3}{4}$ " focus. This plate has special application to operating rooms and skylights. The smooth side of the plate should be towards the light source. The distance of the lamp center above the plate may be varied from  $2\frac{5}{8}$ " to  $5\frac{1}{2}$ ". The lower limit gives a wide diffused beam, the upper limit a sharp narrow beam. The lamp center may be placed eccentric to the lens a maximum of  $1\frac{1}{8}$ " at short focus and  $2\frac{3}{8}$ " at long focus, when it is desired to throw the light out at an angle from the plate. A spherical reflector should be used with this lens to secure a symmetrical light distribution. Holophane reflectors No. 981, 983, 922 or 944 may be used when an asymmetrical distribution is desired.

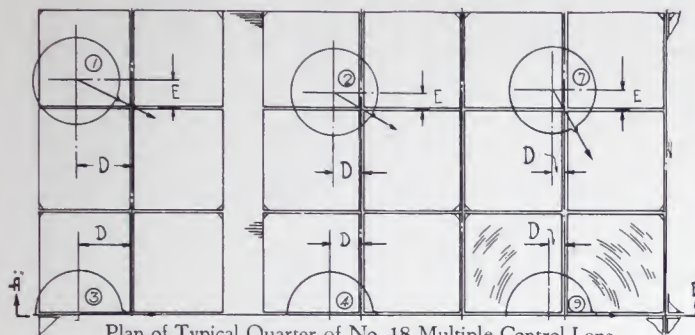


Holophane prismatic plate No. 756 has quarter concentric prisms arranged, when used in groups of four, to form one large lens  $24\frac{1}{4}$ " square having a  $12\frac{1}{4}$ " focus. This plate has special application to operating rooms and skylights. The smooth side of the plate should be towards the light source. The distance of the lamp center above the center of the assembled lens may be varied from 5" to  $11\frac{3}{4}$ ". The lower limit gives a wide diffused beam, the upper limit a sharp narrow beam. The lamp center may be placed eccentric to the lens a maximum of  $2\frac{3}{8}$ " for short focus and  $5\frac{1}{8}$ " for long focus, when it is desired to throw the light out at an angle from the plate. A spherical reflector should be used with this lens to secure a symmetrical light distribution. Holophane reflectors No. 981, 983, 922 or 944 should be used when an asymmetrical distribution is desired. The metal framing members separating the plate segments of a lens should not exceed  $\frac{1}{8}$ " in thickness.

Both lenses are furnished clear or velvet finished, are 12" square (varies  $\frac{1}{8}$ " ),  $\frac{7}{16}$ " thick, standard quantity 25, weight 135 lbs.

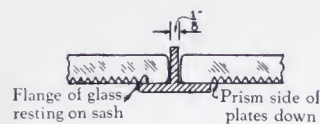


# Hospital Surgery Lighting Details using Lens No. 756

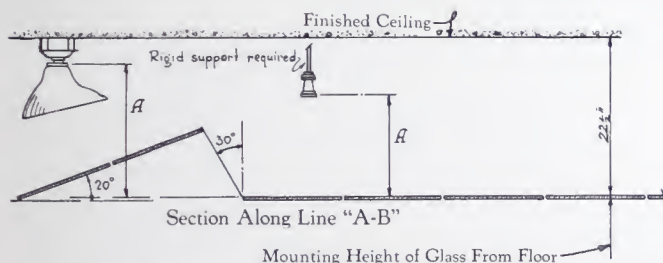


Plan of Typical Quarter of No. 18 Multiple Control Lens System Using No. 756 Lenses

[For Dimensions "D" & "E" See Page 18]

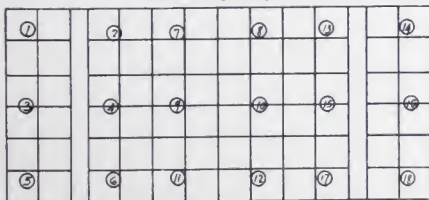


Cross Section Showing Distance Between Plates



Section Along Line "A-B"

Mounting Height of Glass From Floor



Recommended typical switching arrangement:

Outlet Nos. 1, 2, 3, 4, 5, 6 to be one switch.

Outlet Nos. 7 and 8 to be one switch.

Outlet Nos. 9 and 10 to be one switch.

Outlet Nos. 11 and 12 to be one switch.

Outlet Nos. 13, 14, 15, 16, 17, 18 to be one switch.

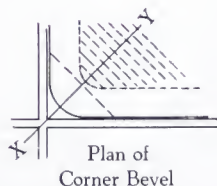
## NOTES:

Use Holophane No. 983 Reflector, in Form "O" Holder with 100 watt inside frosted lamp and 7/8" socket extension, or with 150 watt clear lamp with socket extension removed.

Recess over skylight when complete unit is not supplied by the Holophane Company should be white finished.

The offset in each case is shown with reference to center line of web.

The tip of the reflector in each case should be pointed towards the center of the four part lens.



Plan of Corner Bevel



Section Through "X-Y"

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LIGHTING SPECIFIC FOR MAJOR SURGERIES

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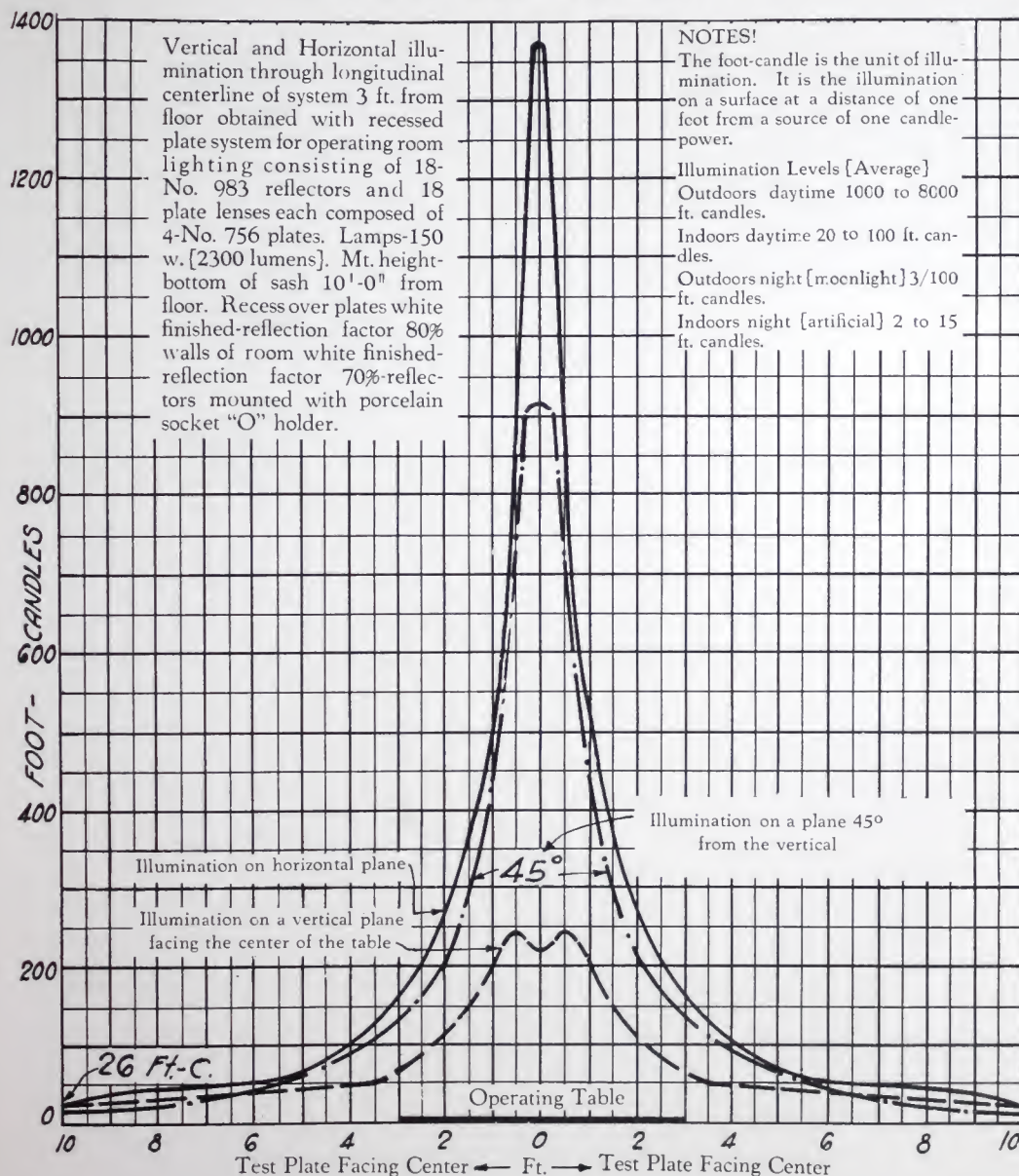


*Illustration of Holographic Operating Room Lighting for Major Surgeries.*

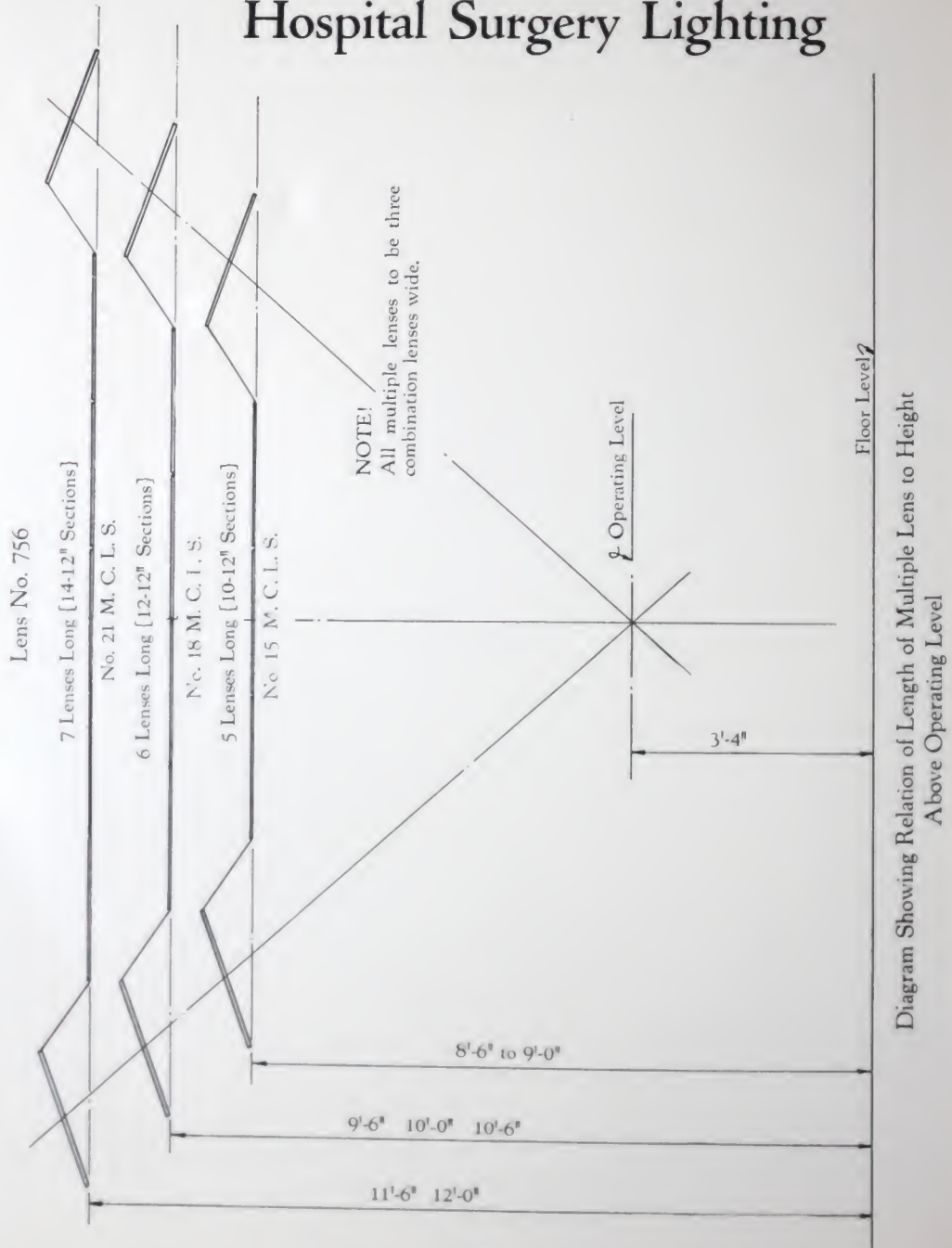


# Hospital Surgery Lighting

## ILLUMINATION CURVES



# Hospital Surgery Lighting



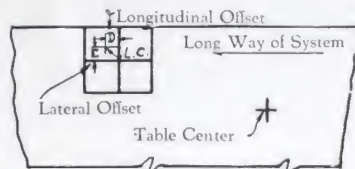


# Hospital Surgery Lighting

## DIMENSION SHEET

Showing Locations of Outlets for No. 15, 18 and 21 Multiple Control Lens System.

| No. 15 MULTIPLE CONTROL LENS SYSTEM             |                    |                   |                   |           |                    |                   |                   |
|---|--------------------|-------------------|-------------------|-----------|--------------------|-------------------|-------------------|
| MOUNTING HEIGHT TO GLASS                        |                    |                   |                   |           |                    |                   |                   |
| 8'-6"   |                    |                   |                   | 9'-0"     |                    |                   |                   |
| OUTLET  | A                  | D                 | E                 | OUTLET    | A                  | D                 | E                 |
| 1-5-11-15                                       | 17"                | 8 $\frac{1}{4}$ " | 3 $\frac{5}{8}$ " | 1-5-11-15 | 17 $\frac{5}{8}$ " | 8"                | 3 $\frac{1}{2}$ " |
| 2-6-10-14                                       | 11 $\frac{1}{2}$ " | 4 $\frac{1}{4}$ " | 4 $\frac{1}{4}$ " | 2-6-10-14 | 12 $\frac{1}{2}$ " | 4 $\frac{1}{4}$ " | 4 $\frac{1}{4}$ " |
| 3-13  | 17 $\frac{1}{2}$ " | 8 $\frac{1}{8}$ " |                   | 3-13      | 18"                | 8 $\frac{1}{8}$ " |                   |
| 4-12  | 15 $\frac{3}{8}$ " | 5 $\frac{1}{2}$ " |                   | 4-12      | 15 $\frac{3}{4}$ " | 5"                |                   |
| 7-9   | 15 $\frac{3}{8}$ " |                   | 5 $\frac{1}{2}$ " | 7-9       | 15 $\frac{3}{4}$ " |                   | 5"                |
| 8   | 16 $\frac{3}{4}$ " |                   |                   | 8         | 16 $\frac{3}{4}$ " |                   |                   |
| No. 18 MULTIPLE CONTROL LENS SYSTEM             |                    |                   |                   |           |                    |                   |                   |
| MOUNTING HEIGHT TO GLASS                        |                    |                   |                   |           |                    |                   |                   |
| 9'-6"   |                    |                   |                   | 10'-0"    |                    |                   |                   |
| OUTLET  | A                  | D                 | E                 | OUTLET    | A                  | D                 | E                 |
| 1-5-14-18                                       | 17 $\frac{1}{2}$ " | 8 $\frac{1}{2}$ " | 3"                | 1-5-14-18 | 18"                | 8 $\frac{1}{8}$ " | 3"                |
| 2-6-13-17                                       | 12"                | 5"                | 3 $\frac{1}{4}$ " | 2-6-13-17 | 12 $\frac{7}{8}$ " | 5"                | 3 $\frac{3}{8}$ " |
| 3-16  | 17 $\frac{5}{8}$ " | 8 $\frac{7}{8}$ " |                   | 3-16      | 18"                | 8 $\frac{1}{2}$ " |                   |
| 4-15  | 13 $\frac{3}{4}$ " | 6"                |                   | 4-15      | 14 $\frac{1}{2}$ " | 6"                |                   |
| 7-8-11-12                                       | 17 $\frac{1}{8}$ " | 2 $\frac{1}{4}$ " | 4 $\frac{5}{8}$ " | 7-8-11-12 | 15 $\frac{7}{8}$ " | 2 $\frac{1}{8}$ " | 4 $\frac{1}{4}$ " |
| 9-10  | 16 $\frac{1}{2}$ " | 2 $\frac{3}{8}$ " |                   | 9-10      | 16 $\frac{1}{2}$ " | 2 $\frac{1}{4}$ " |                   |
| No. 18 MULTIPLE CONTROL LENS SYSTEM             |                    |                   |                   |           |                    |                   |                   |
| MOUNTING HEIGHT TO GLASS                        |                    |                   |                   |           |                    |                   |                   |
| 10'-6"  |                    |                   |                   | 11'-0"    |                    |                   |                   |
| OUTLET  | A                  | D                 | E                 | OUTLET    | A                  | D                 | E                 |
| 1-5-14-18                                       | 18 $\frac{1}{4}$ " | 7 $\frac{3}{4}$ " | 2 $\frac{3}{4}$ " | 1-5-14-18 | 18 $\frac{1}{2}$ " | 7 $\frac{3}{8}$ " | 2 $\frac{3}{4}$ " |
| 2-6-13-17                                       | 13 $\frac{1}{2}$ " | 5"                | 3 $\frac{1}{4}$ " | 2-6-13-17 | 14 $\frac{1}{8}$ " | 5"                | 3 $\frac{3}{8}$ " |
| 3-16  | 18 $\frac{1}{4}$ " | 8 $\frac{1}{8}$ " |                   | 3-16      | 18 $\frac{1}{2}$ " | 7 $\frac{3}{4}$ " |                   |
| 4-15  | 15 $\frac{1}{8}$ " | 5 $\frac{3}{4}$ " |                   | 4-15      | 15 $\frac{5}{8}$ " | 5 $\frac{1}{2}$ " |                   |
| 7-8-11-12                                       | 16 $\frac{3}{8}$ " | 2"                | 4"                | 7-8-11-12 | 16 $\frac{1}{8}$ " | 1 $\frac{7}{8}$ " | 3 $\frac{3}{4}$ " |
| 9-10  | 16 $\frac{1}{2}$ " | 2 $\frac{1}{4}$ " |                   | 9-10      | 16 $\frac{5}{8}$ " | 2"                |                   |
| No. 21 MULTIPLE CONTROL LENS SYSTEM             |                    |                   |                   |           |                    |                   |                   |
| MOUNTING HEIGHT TO GLASS                        |                    |                   |                   |           |                    |                   |                   |
| 11'-6"  |                    |                   |                   | 12'-0"    |                    |                   |                   |
| OUTLET  | A                  | D                 | E                 | OUTLET    | A                  | D                 | E                 |
| 1-5-17-21                                       | 17 $\frac{5}{8}$ " | 8 $\frac{3}{8}$ " | 2 $\frac{1}{2}$ " | 1-5-17-21 | 18 $\frac{1}{4}$ " | 7 $\frac{7}{8}$ " | 2 $\frac{3}{8}$ " |
| 2-6-16-20                                       | 12 $\frac{3}{4}$ " | 7 $\frac{1}{2}$ " | 3 $\frac{3}{4}$ " | 2-6-16-20 | 13 $\frac{1}{4}$ " | 8 $\frac{3}{8}$ " | 4"                |
| 3-19  | 18"                | 8 $\frac{3}{8}$ " |                   | 3-19      | 18 $\frac{1}{4}$ " | 8"                |                   |
| 4-18  | 13 $\frac{3}{4}$ " | 6"                |                   | 4-18      | 14 $\frac{1}{4}$ " | 6"                |                   |
| 7-9-13-15                                       | 15 $\frac{7}{8}$ " | 3 $\frac{3}{8}$ " | 3 $\frac{3}{8}$ " | 7-9-13-15 | 16"                | 3 $\frac{1}{4}$ " | 3 $\frac{1}{4}$ " |
| 8-14  | 16 $\frac{1}{4}$ " |                   | 3 $\frac{1}{2}$ " | 8-14      | 16 $\frac{1}{4}$ " |                   | 3 $\frac{3}{8}$ " |
| 10-12   | 16 $\frac{1}{4}$ " | 3 $\frac{1}{2}$ " |                   | 10-12     | 16 $\frac{1}{4}$ " | 3 $\frac{3}{8}$ " |                   |
| 11  | 16 $\frac{3}{4}$ " |                   |                   | 11        | 16 $\frac{3}{4}$ " |                   |                   |
| MOUNTING HEIGHT IS FROM FLOOR TO BOTTOM OF SASH |                    |                   |                   |           |                    |                   |                   |



Offsets are with Reference to Centers of Webs



Dimension "A" is the Distance from Bottom of Socket to Top of Horizontal Lenses

### Outlet Numbers

#### 15 Lens System

|   |   |   |    |    |
|---|---|---|----|----|
| 1 | 2 | 7 | 10 | 11 |
| 3 | 4 | 8 | 12 | 13 |
| 5 | 6 | 9 | 14 | 15 |

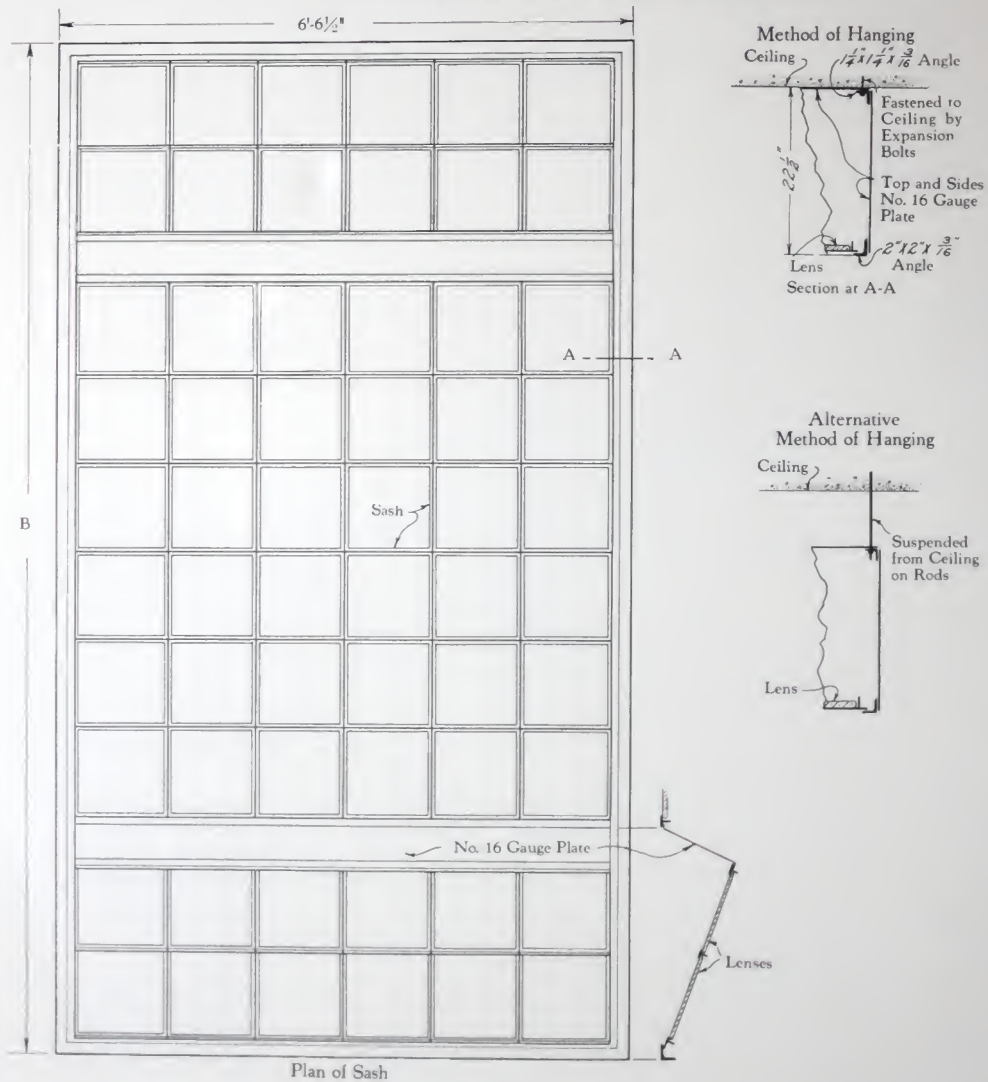
#### 18 Lens System

|   |   |    |    |    |    |
|---|---|----|----|----|----|
| 1 | 2 | 7  | 8  | 13 | 14 |
| 3 | 4 | 9  | 10 | 15 | 16 |
| 5 | 6 | 11 | 12 | 17 | 18 |

#### 21 Lens System

|   |   |    |    |    |    |    |
|---|---|----|----|----|----|----|
| 1 | 2 | 7  | 8  | 9  | 16 | 17 |
| 3 | 4 | 10 | 11 | 12 | 18 | 19 |
| 5 | 6 | 13 | 14 | 15 | 20 | 21 |

## Construction Details



| SYSTEM | DIMENSION - B         |
|--------|-----------------------|
| No. 15 | $11' - 6\frac{1}{2}"$ |
| No. 18 | $13' - 7"$            |
| No. 21 | $15' - 7\frac{1}{2}"$ |

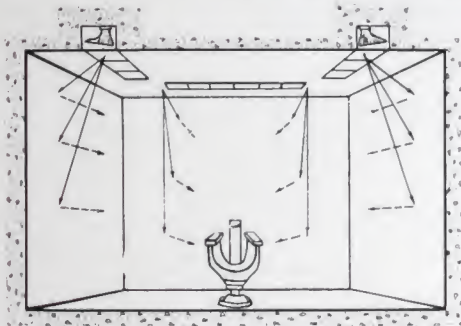
## No. 4 Multiple Border Lens System

### EYE - EAR - NOSE AND THROAT ROOM

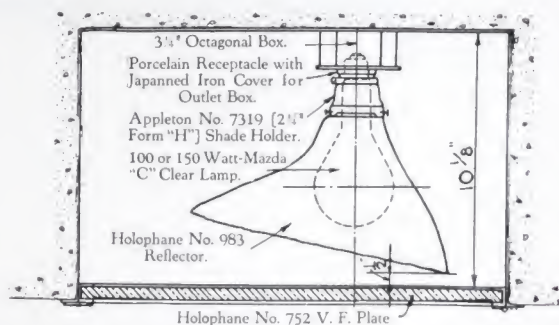
The types of operations performed on the eyes, ears, nose and throat are such as to make local lighting necessary.

The specific for this particular surgery is a fair level of general illumination with a high vertical component and suitable spotlights or headlights.

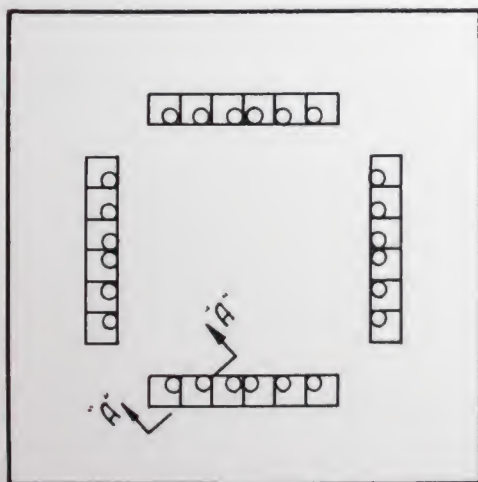
The general illumination may be secured by means of a lens border using the lens member No. 752, which is described and illustrated on the following page.



Diagrammatic Perspective



Section "A-A"



Lamp Pattern

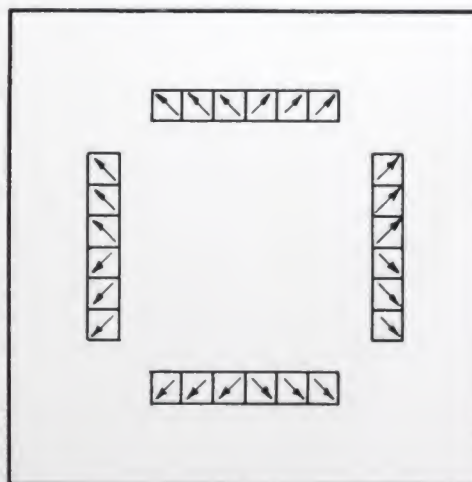


Plate Pattern

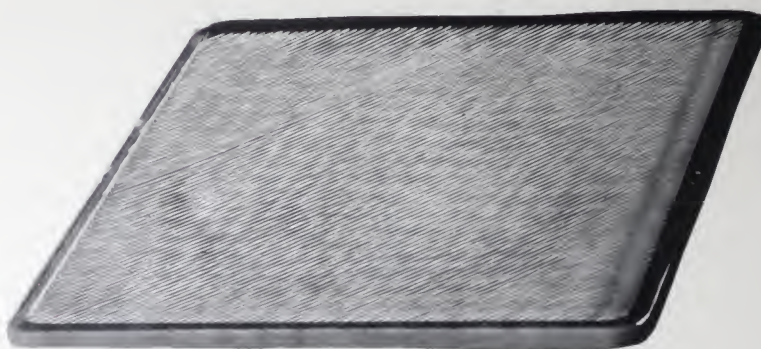
Above is a sketch showing the general effect and diagrams giving the lens and lamp pattern required.



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LIGHTING SPECIFIC FOR MINOR SURGERIES

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Holophane prismatic lens No. 752 has diagonal prisms arranged to receive light from a lamp with reflector and throw it out at an angle to the perpendicular axis of the plate in the direction shown by arrows molded in the glass. It has special application to locations where surfaces vertical to the lens, such as walls, are to be lighted.

For best results the prism side of the lens should be towards the light source. The distance of the lamp center above the lens may be varied from  $3\frac{1}{4}$ " to  $5\frac{1}{2}$ ". If one lamp is to be mounted over a number of lenses the limits in position of the light center will bear the same relationship to the lineal dimensions of the area as the above figures do to one plate. (Ex. gr. One lamp over four plates should have filament not lower than  $6\frac{1}{2}$ " and not higher than 11" over the plates). Holophane intensive reflectors should be used, unless it is desired to throw the flood out at a higher angle from the plate than usual, in which case the reflector may be tilted or Holophane reflectors No. 981, 983, 922 or 944 may be used. In these latter cases the lamp filament may be mounted away from center of plate and away from the arrows, along the diagonal a maximum of 1 inch and in proportion for multiples of one plate.

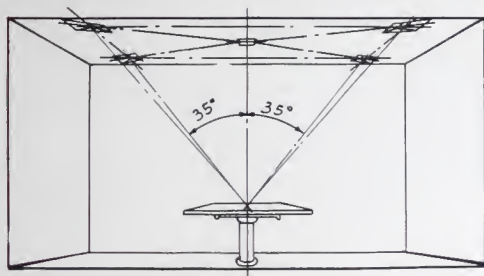
| CATALOG<br>NUMBER | DIMENSIONS    |                           | REMARKS             |
|-------------------|---------------|---------------------------|---------------------|
|                   | DIAMETER      | DEPTH                     |                     |
| 752 V.F.          | 12"<br>Square | $\frac{7}{16}$ "<br>Thick | For minor surgeries |

# No. 5 Multiple Spot Lens System

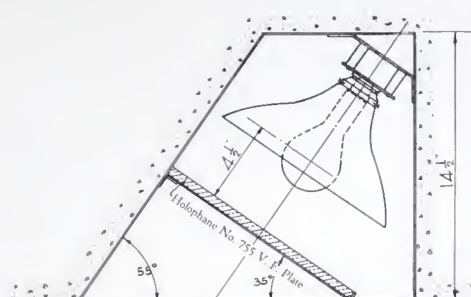
## EMERGENCY ROOM LIGHTING

These rooms, being mainly used for the preliminary examination of accident victims, the rendering of first aid and the setting of fractures, do not necessitate such careful and powerful illumination as major operating rooms.

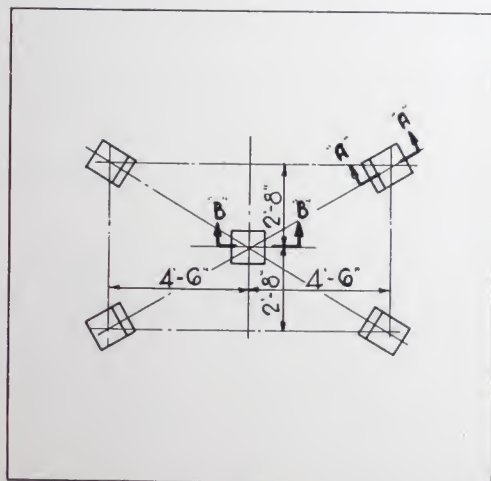
Below is shown a plan and sectional elevation perspective of the proper method of illuminating emergency rooms, with details of the individual units.



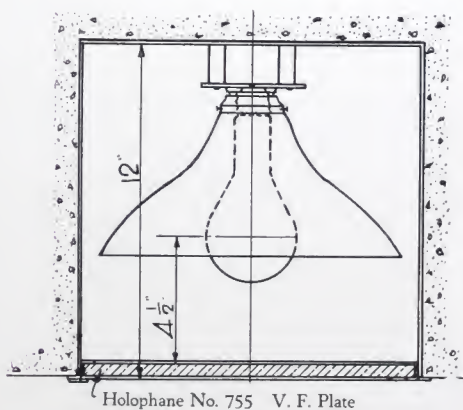
Diagrammatic Perspective



Section "A-A"



Plan



Section "B-B"

### NOTES:

Use 3 1/4" octagonal outlet box.

Use porcelain receptacles with japanned iron cover for outlet box.

100 or 150 Watt Mazda "C" Clear Lamp—with 100 watt I. F. lamp use 7/8" socket extension.

Use 2 1/4" Form "O" Holder.

Inside of recess should be white finished.



## No. 3

# Multiple Strip and Border Lens System

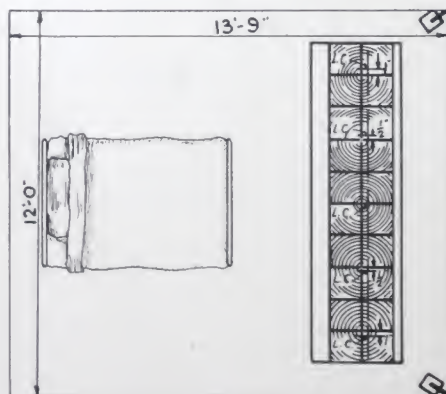
### DELIVERY ROOMS

In the past, delivery rooms have been treated in the same manner as wards in every respect. The only difference has been the label on the plan. The fact that the ordinary delivery is a routine matter and that if any complication comes up the case is rushed to an operating room, gives some show of justification for the general disregard of special illumination.

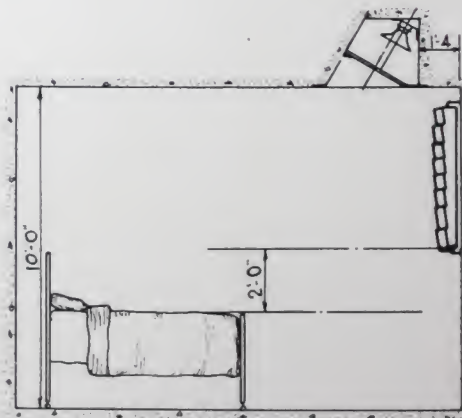
However, the propagation of mankind is the one central fact around which life is built. Nothing is quite so important. Adequate illumination of the process of birth is the most important matter in the whole field of illumination and in any particular case may conceivably represent the narrow margin between safety and danger, life and death.

The very special requirements of the delivery room are best met by a fair level of general illumination and a high level of local illumination, as in the case of major operating rooms, but with these differences: the general illumination can be lower and the spotlighting should come from the end of the room facing the foot of the bed and from the wall corners. In this way the light will have the strong penetrating quality necessary and the proper direction.

A plan, sectional elevation and details of the lighting system dictated by these requirements are given below and on page 27.



Plan

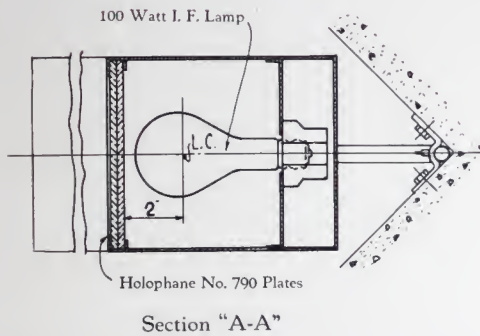


Elevation

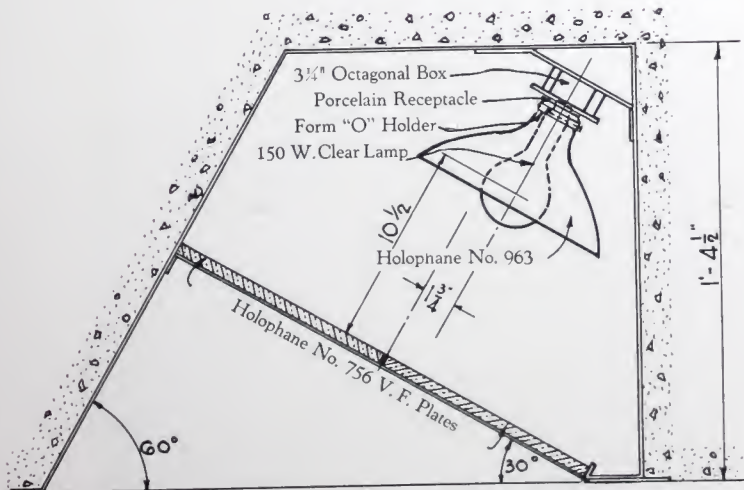
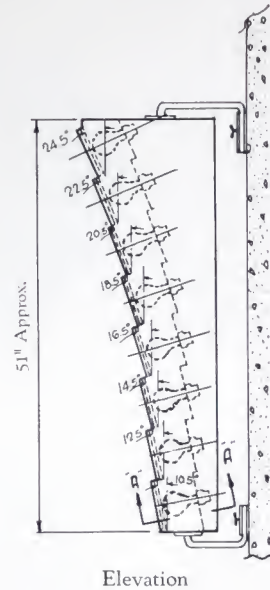


# Multiple Strip and Border Lens System

## DELIVERY ROOMS



Section and Elevation of Multiple Strip Lens System



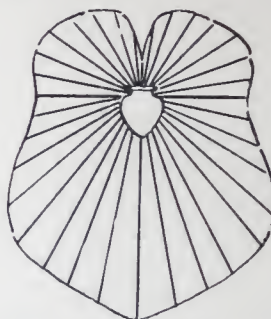
Sectional Elevation of Ceiling Unit

## Dental Surgeries

### Holophane Specific for Dental Work



No. 3354



Characteristic Curve No. 3354

Illustration of Lighting Unit as Installed



Illustration furnished through the courtesy of the  
Electro-Dental Manufacturing Co., of Philadelphia, Pa.

## Booklets

- Bulletin No. 250 —Scientific Street Lighting.  
350 —Streets That Are Safe.  
344-A—The Lighting of Schools.  
356 —Holophane Filterlite.  
375-E—Holophane Datalog.  
444-A—Modern Retailing Success.  
448 —Industrial Lighting.  
500 —The Lighting of Modern Office Buildings.  
600 —Lighting Specifics for Gasoline Stations.

## Folders

- Form No. 399—Holophane Filterlite.  
401—Light for Industrial Efficiency.  
447—Successful Retailing.  
464—Profitable Store Lighting.  
465—Successful Office Lighting.  
466—Holophane Gloria Lamps.  
470—Hospital Lighting Specifics.  
475—Wide Spread Light.

## Special Engineering Folios

- Folio No. 1—Lighting Specific for High Bays.  
2—Lighting Specific for Gasoline Filling Stations.  
3—Lighting Specific for Outdoor Substations.  
4—Lighting Specific for Industrial Yards.  
5—Lighting Specific for Silk Mills.  
6—Lighting Specific for Air Fields.  
7—Lighting Specific for Hospitals.  
8—Lighting Specific Planned Street Lighting.

## Films

The following films for use with the Bray and other projectors can be furnished on request at a nominal charge:

- Film No. 1161—Holophane Industrial Lighting.  
1263—Holophane Scientific Illumination.  
1308—Productive Lighting in Industry.  
1329—Scientific Street Lighting.  
W-78—Modern Retailing Success.



The Holophane Engineering Department is maintained for the assistance and advice of users of the product and will gladly help an inquirer in any way possible, including the preparation of reports, surveys and such expert specifications and drawings as may be necessary for the solution of any particular lighting problem.

Full size details and data sheets for transference to architects' or engineers' drawings, etc., will be supplied on application to the Engineering Department, Holophane Company, Inc., 342 Madison Avenue, New York, N. Y. Copies of the publications listed on the preceding page may also be secured by writing to this address.

Holophane Engineering service is not offered in substitution for, or competition with the professional services of architects or engineers. Our service is usually rendered through the architect or engineer to his client and is supplementary to their advice.



